Assessments of coping after acquired brain injury: a systematic review of instrument conceptualization, feasibility, and psychometric properties

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Assessments of Coping After Acquired Brain Injury: A Systematic Review of Instrument Conceptualization, Feasibility, and Psychometric Properties

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Objective: To identify measures of coping styles used by patients with acquired brain injury; to evaluate the conceptualization, feasibility, and psychometric properties of the instruments; and to provide guidance for researchers and clinicians in the choice of a suitable instrument. **Design:** Systematic review. **Results:** The search identified 47 instruments, of which 14 were selected. The instruments focused on dispositional coping, situation-specific coping, or domain-specific coping. Psychometric properties were scarcely investigated. The COPE stood out in terms of psychometric properties but had low feasibility. The brief COPE, Coping Scale for Adults-short form, and Utrecht Coping List stood out in terms of feasibility, and the available psychometric properties of these instruments were good. Only the Coping With Health Injuries and Problems was used as other report. **Conclusion:** Information on psychometric properties of coping instruments in acquired brain injury is scarcely available and limits the strength of our recommendations. For patients with mild injuries, we cautiously recommend the COPE and for patients with more severe injuries the brief COPE, Coping Scale for Adults-short form, Utrecht Coping List, and Coping With Health Injuries and Problems-other-report. Other instruments may be used to address particular issues such as coping with a specific stressful situation or illness. **Key words:** *brain injuries*, *coping*, *psychometrics*, *questionnaires*, *review*

ACQUIRED BRAIN INJURY (ABI) refers to any nonprogressive injury to the brain after birth. The 2 most common forms of ABI are strokes and traumatic brain injuries. Other forms of ABI include brain tumors, encephalitis, and hydrocephalus.[1] After ABI, patients can suffer from long-lasting cognitive, behavioral, and emotional deficits that interfere with many aspects of daily life and psychosocial functioning. In the last 2 decades, many studies have explored the factors associated with and predictive of psychosocial outcomes after ABI.[2–5] Coping style has been suggested as a key concept, helping to explain the effects of stress on productivity, social activity, emotional stability, and quality of life after ABI. Although the important role of coping after ABI has been widely accepted, the coping construct itself is complex and vague.[6] Therefore, its assessment is problematic, and several issues in measuring coping must be acknowledged.

The use of different theoretical backgrounds, definitions, and classifications of coping are complicating factors. In the conceptualization of coping, the focus can be on dispositional, situation-specific, or domain-specific coping. Furthermore, it has been suggested that

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these 3 foci are interrelated.[7] Situation-specific (transactional) coping, the dominant view, is regarded as a dynamic and situation-dependent process, defined as "the person's cognitive and behavioral efforts to manage (reduce, minimize, master, or tolerate) the internal and external demands of the person-environment transaction that is appraised as taxing or exceeding the person's resources."[8(p572)] Coping can also be conceptualized as a style or disposition.[9] This view does not consider coping to be a stable trait but assumes that people prefer certain coping styles over others. Moreover, this preference may change over time, for example, after a major life event or behavioral treatment.[10] Domain-specific coping resembles the dispositional view: it is relatively stable across stressors within a single domain. However, for different domains the coping repertoire used may vary. A specific medical condition, such as brain injury, may define a domain.[7] Compounding the lack of consensus on the conceptualization of coping is that the terms coping actions, strategies, styles, and efforts are often used interchangeably[11] both in clinical practice and in scientific writing. It is, however, important to distinguish among coping styles (eg, active problem solving, avoidance, and reassuring thoughts) and coping resources (eg, optimism, mastery, self-esteem, and social support). It has been suggested that coping styles mediate the relations among these resources and psychosocial functioning, explaining unique variations in outcomes.[12]

While some coping instruments have been constructed using factor analysis, other instruments have been formulated by more theoretical approaches.[13] Consequently, these approaches differentially influence the number and content of the factors, complicating comparison of results obtained with different coping instruments. Furthermore, when comparing subscales of different instruments, similarity in terminology does not necessarily translate to similarity in conceptualization or meaning. For example, problem-focused coping can imply actively searching for more information but could also refer to seeking social support. Even subscales with similar names, which arose from different factor analyses, can contain different items.[14]

Although a sizeable number of coping instruments exist,[6] appropriate instrument selection for use with patients with ABI remains difficult. Cognitive and behavioral deficits can interfere with a patient's ability to complete the questionnaires. Aphasia, even in subtle cases, can interfere with the ability to understand the questions. Inattentiveness, memory deficits, or mental fatigue could also prevent patients from completing an assessment in a reliable and valid fashion.

To facilitate and optimize the selection of coping instruments in ABI, 3 separate aspects must be considered. The first consideration is the focus of coping, that is, dispositional, situation-specific, or domain-specific.[7] The second consideration should be an instrument's feasibility, for example, administration duration. The third consideration is the available psychometric data on the given population, in our case, individuals with ABI. In this review, we define coping as the cognitive and behavioral efforts to deal with stressful events, including daily problems or life events (eg, illness), as well as dispositional, situation-specific, or domain-specific coping.[8]

In the area of ABI, a critical overview of coping instruments and their properties is lacking. Most coping instruments were standardized for use in general settings; consequently, reviews and surveys have not focused specifically on coping in patients with ABI.[6,15,16] The only published systematic review on coping assessment after brain injury was limited to patients with stroke and focused on the conceptualization of coping in the studies, psychometric properties of the instruments identified, the domains assessed, and the coping styles used by the patients.[17] The literature search was valid to early 2006, but information about the focus of the coping instruments and their feasibility was not provided.

Therefore, the goal of this systematic review was to broaden the search criteria and review methods previously used by Donnellan et al.[17] We attempted to answer the following research questions: (*a*) Which instruments have been used in empirical studies investigating coping after ABI? (*b*) What is known about the conceptualization of coping on which the instruments are based, their feasibility, and psychometric properties in patients with ABI? (*c*) Which coping instruments can be recommended for use with patients with ABI?

METHODS

Selection procedure of articles and instruments

Coping measures were identified using a systematic computerized literature search in PubMed, PsycINFO, and CINAHL from January 1970 to November 2011. Free-text words as well as MeSH terms specifying each of the 2 components of the search question-–coping and brain injury–were combined. Details of the search can be found in Appendix 1. Articles were included if they described an empirical study assessing coping after ABI in adults (aged 18 years or older) and if they were written in English. Reviews and case studies were excluded.

Measures were identified as coping instruments by the description of the measure's concept, with coping defined as cognitively and behaviorally dealing with stressful situations.[8] The stressful situations can include daily problems or life events such as illnesses. Instruments were excluded if they were utilized in 1 patient sample and if they were unavailable. Also excluded were instruments in which (*a*) coping with a specific symptom of ABI was measured, for example, pain or vertigo; (*b*) the

coping assessment was limited to the general capacity to solve problems or to either cognitive or behavioral coping; (*c*) coping usefulness, effectiveness, or capacity was investigated (eg, instances in which someone had been able to cope with a problem in general, but specific coping styles that had been used were not mentioned); (*d*) only 1 aspect of coping was measured (eg, avoidance); and (*e*) coping was investigated using an unstructured or semistructured assessment (eg, an unstructured interview).

Two authors (GWG and IB) performed the selection procedure independently. The first selection of articles was based on the title and abstract, and the definitive selection was then made on the basis of the full text of the article. We also reviewed the reference lists of the identified articles. After the selection procedure, any disagreements about inclusion or exclusion (which typically arose from vague descriptions of coping) were resolved by discussion until consensus was reached. A third reviewer (CvH) was consulted when no initial consensus could be reached.

Properties of instruments

After the selection process, GWG and IB searched the articles for information about the conceptualization, feasibility, reliability, validity, and responsiveness of the instruments. We contacted the authors who developed the instruments for copies and manuals of the instruments.

Evaluation of conceptualization and feasibility

The conceptualization of the instruments was rated according to 4 aspects, based on information in the selected article, the manual, or the instrument. First, the focus of the coping instrument (eg, dispositional) was identified. Second, the time frame in which the stressful situation appeared was noted, where applicable. Third, the number and content of the domains were reported. Fourth, the response format was identified.

Similarly, the feasibility, or utility, of the instruments was rated according to 4 aspects: availability of the instrument, the different languages used in the selected studies, the number of items, and the administration duration, that is, the burden for the respondent.[18]

Evaluation of reliability, validity, and responsiveness

The psychometric properties were evaluated according to the criteria used in the systematic review of Visser-Meily et al.[19] Internal consistency was considered to be good if the available Cronbach α was more than 0.8, moderate if it was between 0.7 and 0.8, or poor if it was less than 0.7. Test-retest reliability was considered to be good if the reported intraclass correlation coefficient or κ was more than 0.6, moderate if it was between 0.3 and 0.6, and poor if it was less than 0.3. Construct validity was investigated by comparing subscales of the selected coping instruments with similar subscales of other coping instruments (convergent validity) and by comparing the obtained factor structure with the original factor structure (factorial validity). Convergent validity was considered to be good if the correlation coefficients between similar coping subscales were more than 0.6, moderate if the coefficients were between 0.3 and 0.6, and poor if the coefficients were less than 0.3. Factorial validity was considered positive if the multidimensional structure was confirmed by factor or principal components analysis and negative if it was not confirmed. Finally, instrument responsiveness was interpreted as positive if the changes in a clinical trial or follow-up study were significant ($P < .05$). Responsiveness was interpreted as unknown when there were no changes in coping, as it is possible that coping had not changed.

RESULTS

The literature search identified 1245 articles, of which 293 articles were duplicates. The remaining 952 articles were evaluated according to our inclusion and exclusion criteria. In addition, we found 6 potentially pertinent articles after reviewing the reference lists.[20–25] However, one could not be retrieved despite numerous efforts to obtain it and was therefore excluded.[21] Ultimately, 58 articles met the inclusion and exclusion criteria (see Figure 1). We reviewed the psychometric properties of 14 instruments (see Table 1). The articles that were excluded after reviewing the full texts included 33 instruments. The excluded instruments and reasons for exclusion are described in Appendix 2.

Conceptualization and feasibility

Table 1 displays descriptions of instrument conceptualization and feasibility. Instruments were primarily self-report measures with the exception of the Coping With Health Injuries and Problems (CHIP), which was also used as an other-report measure.[26] Most instruments measured situation-specific coping. These included the Assimilative Accommodative Coping Scale (AACS), the Coping Inventory for Stressful Situations (CISS), the Coping Style Questionnaire (CSQ), the Ways of Coping Checklist Revised (WCCL(R)), and the Ways of Coping Questionnaire-revised (WCQ-r). Instruments that measured dispositional coping included the Utrecht Coping List original and revised versions (UCL-o and UCL). Some instruments had both a dispositional and a situation-specific version available; these were the COPE, the brief COPE, and the Coping Scale for Adults-short (CSA-s; an adapted version of the Adolescent Coping Scale[27]). Domain-specific coping

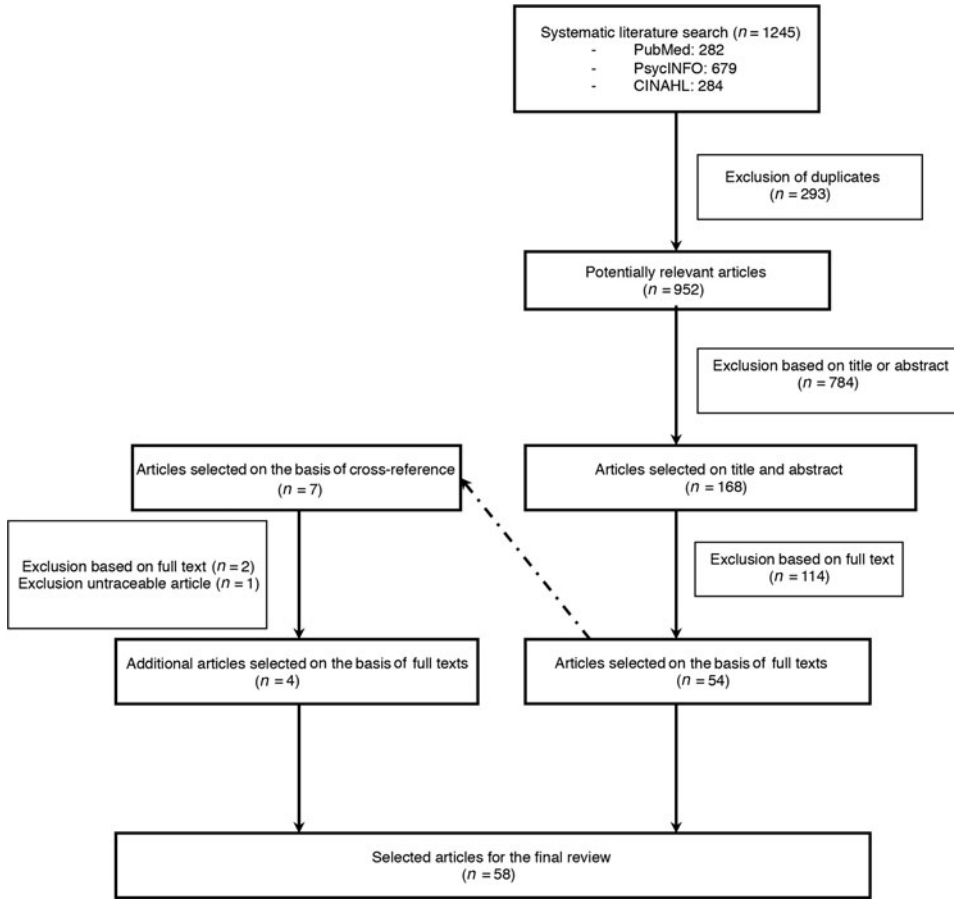

Figure 1. Flowchart of selected articles.

instruments reviewed were the CHIP, the Freiburg Questionnaire on Coping with Illness-short (FQCI-s), the Mental Adjustment to Stroke Scale (MASS), and the Trier Scales on Coping With Illness (TSCI). The temporal aspect of the specific stressful situation was reported only for the situation-specific coping instruments and was either vague (a situation in the past) or in the 12 months prior to the time of assessment. The number of domains ranged from 2 to 15 subscales, and almost all instruments used a Likert scale ranging from 3 to 5 responses. Two instruments used a dichotomous answer format (yes/no), the CSQ and the WCCL(R).

Examination of feasibility showed that most instruments were available through the publisher. Only the AACS (Dutch version), COPE, brief COPE, WCCL(R), and WCQ-r (1985 version) were freely available via the Internet or by contacting the author. The MASS is a minor modification of the Mental Adjustment to Cancer (MAC) scale with the word cancer changed to stroke.[28] The number of items ranged from 19 to 66, and administration time was between 5 and 30 minutes. Most instruments had a German, Dutch, or English version. Different versions in other languages exist for many of the measures in the non–ABI-specific literature (for more information, please contact the corresponding author).

Psychometric properties

Table 2 contains a summary of the reliability, validity, and responsiveness of the coping instruments. Detailed information about the patient characteristics and psychometric properties is provided in Supplement Digital Content Table 1, available at: http://links.lww.com/JHTR/A75. The brief COPE and WCCL(R) stood out in terms of internal consistency.[25,29] However, most scales and subscales had moderate-to-low internal consistencies as indicated by Cronbach α values of less than 0.80,[4,30–32] with the CHIP, COPE, MASS, TSCI, and WCQ-r having one or more α values higher than 0.80.[23,25,29,33–37] In 6 of 14 instruments, information about internal consistency was not provided. Only the test-retest reliability was calculated for the MASS, which had reasonable reliability (κ, 0.18-0.89).[23]

Because each study used only 1 instrument to assess coping, information about convergent validity was unavailable. Studies using the brief COPE, the COPE, WCCL(R), and WCQ-r reported information about

TABLE 1 *Conceptualization and utility*

Instrument	Items, domains	Scale	Focus of coping	Availability	Languages used in ABI studies	Adm
AACS[102,103]	30 items, 2 scales: tenacious goal pursuit and flexible goal adjustment	5-point scale	(S) Predefined stressful situation, at this moment	Author (Dutch version)	Dutch	15
Brief COPE[104]	28 questions, 2 scales (14 subscales): maladaptive coping (denial, behavioral disengagement, substance use, venting, self-blame, and self-distraction), adaptive coping (active coping, seeking emotional support, seeking instrumental support, positive reframing, planning, humor, acceptance, and religion)	4-point scale	(D, S) Difficult or stressful events in general/specific period	Web site	English	15
CHIP[105]	32 items, 4 scales: distraction, palliative, instrumental, and emotional preoccupation	5-point scale	(DO) Self-defined health problem	Publisher	English, German, Italian, Spanish, Portuguese, Serbo-Croatian, Turkish, or Albanian	5–10
CISS[106]	48 items, 3 scales (2 subscales): task-oriented, emotion-oriented, and avoidance-oriented (distraction, social diversion)	5-point scale	(S) Stressful situation	Publisher	English, Polish	10
COPE[50]	60 strategies, 3 scales (15 subscales): active coping (active coping, planning, seeking instrumental social support, seeking emotional social support, suppression of competing activities, positive reinterpretation and growth, restraint coping, acceptance), avoidance (denial, mental disengagement, behavioral disengagement, focus on and venting of emotions), and additional (humor, alcohol or drug use, and religion)	4-point scale	(D, S) Difficult or stressful events in general/specific period	Web site	English, Estonian, Norwegian	20–30
CSA-s[107]	20 items, 4 scales: dealing with the problem, nonproductive coping, optimism, sharing.	5-point scale	(D, S) Overall concerns and self- or administrator-nominated concern	Publisher	English	5–7
CSQ[108]	19/20 items, 5 scales: active cognitive, active behavioral, avoidance, problem-focused, and emotion-focused	Dichotomous	(S) Self-defined personal crisis or stressful life event	Publisher	English	?

(continued)

TABLE 1 *Conceptualization and utility* (Continued)

Instrument	Items, domains	Scale	Focus of coping	Availability	Languages used in ABI studies	Adm
FQCI-s[109]	35 items, 5 scales: depressive coping, active problem-oriented coping, distraction and self-reorganization, religious relief/quest for sense, minimization, and wishful thinking	5-point scale	(DO) Coping related with chronic illness, in the last week, at the time of diagnosis, or in general	Publisher	German	10–15
MASS[110]	40 items, 5 scales: fighting spirit, anxious preoccupation, fatalism, avoidance, helplessness/hopelessness	4-point scale	(DO) Coping with stroke, at present	Not available. MAC available via author	English	5
TCS/TSCI[111]	37 items, 5 scales: rumination, search for affiliation, threat minimization, information seeking, search for meaning in religion	6-point scale	(DO) Coping related with severe physical diseases, during the past few weeks	Publisher	German	15
UCL-o[112]	47 items, 7 scales: active problem solving, palliative response, avoidance and passive expectancy, seeking social support, depressive reaction, expression of emotion and anger, comforting cognitions	4-point scale	(D) Problems in general	Publisher	Dutch	5
UCL[10]	47 items, 7 scales: active problem solving, and palliative reactions, avoidance, seeking social support, passive reactions, expression of emotions, and reassuring thoughts	4-point scale	(D) Problems in general	Publisher	Dutch	5
WCCL(R)[29]	42 items, 4 dimensions: problem-focused coping, emotion-focused coping, avoidance coping, wishful thinking	Dichotomous	(S) Specific stressful event	Author	English	10
WCQ-r[113]	66 item, 8 dimensions: planful problem solving, self-controlling, seeking social support, positive reappraisal, confrontive coping, escape-avoidance, distancing, accepting responsibility	4-point scale	(S) Specific stressful event	Author (1985), Publisher (1988)	English	10

Abbreviations: AACS, Assimilative Accommodative Coping Scale; ABI, acquired brain injury; Adm, administration duration in minutes; CHIP, Coping With Health Injuries and Problems; CISS, Coping Inventory for Stressful Situations; COPE; CSA, Coping Scale for Adults; CSQ, Coping Style Questionnaire; FQCI, Freiburg Questionnaire on Coping With Illness; MAC, Mental Adjustment to Cancer; MASS, Mental Adjustment to Stroke Scale; TCS, Trier Coping Scales; TSCI, Trier Scales on Coping With Illness; UCL, Utrecht Coping List; WCCL(R), Ways of Coping Checklist Revised; WCQ, Ways of Coping Questionnaire; -s, short version; -r, revised version; -o, original version; (S), situation-specific coping; (D), dispositional coping; (DO), domain-specific coping.

factor structure.[4,25,29,37–40] Only the factor structure of the brief COPE was confirmed. Finally, 7 instruments demonstrated responsiveness to change, that is, the CHIP, COPE, CSA-s, FQCI-s, TSCI, UCL, and WCQ-r.[5,26,31,35,36,41–46] The responsiveness of other instruments was either not investigated or unclear.

DISCUSSION

The purpose of this systematic review was to examine instruments used to assess coping after ABI; describe their conceptualization, feasibility, and psychometric properties; and provide guidance in selecting the most appropriate instrument for use in populations with ABI. Fourteen instruments met the inclusion and exclusion criteria. All were questionnaires, and most were self-report instruments, except for the CHIP which has also been used as an other-report instrument in patients with traumatic brain injury.[26]

As mentioned previously, 3 primary factors should be considered when choosing a coping instrument for use in the ABI population: the focus of the coping instrument (dispositional, situation-specific, or domain-specific coping), its feasibility in patients with ABI, and the psychometric properties as reported in ABI populations.

First, the conceptualization of coping, that is, the focus of the clinician or researcher, is important. To measure an individual's coping with a particular stressful situation, a questionnaire that measures situation-specific coping is most appropriate. Although situation-specific coping questionnaires are appealing because of their simplicity, they should be administered more than once to determine a patient's generally preferred coping style or explore the variability in coping preferences when facing different situations or problems. This manner of assessment requires additional administration time. For this purpose, a questionnaire of limited length would be preferable, especially when cognitive deficits are present. In addition, it has been suggested that requiring self-generation of stressful situations is difficult for many patients with ABI, and consequently less valid.[47] Assessing domain-specific coping is useful when the focus is on coping with health problems such as a specific illness or disease.[6] However, to understand one's general coping preferences, we recommend using disposition-specific questionnaires, including the COPE, brief COPE, UCL, and CSA-s. These questionnaires can also be used to examine changes in preferred style when confronted with a major life event such as an ABI.

Second, patients can suffer from a wide array of symptoms and levels of disability after ABI. The frequent presence of cognitive deficits along with language and communication problems after ABI necessitates careful consideration when choosing assessment instruments. Because of cognitive impairments such as inattentiveness or mental fatigue, patients with ABI may need more time than the normal population to complete coping instruments. In the presence of cognitive deficits, an instrument with a shorter duration of administration would be preferable. The instruments having the shortest administration time (maximum 10 minutes) are the CHIP, CISS, CSA-s, MASS, UCL, and WCQ-r. Patients with language and communication problems (often observed after stroke) might struggle with the self-report format of many questionnaires. Patients with limited self-awareness (often observed after traumatic brain injury because of the greater risk for frontal lobe damage) might not actually experience problems and consequently will not employ and report coping strategies. As an alternative to self-report, only the CHIP is being used as an other-report tool for patients with ABI. However, other reports also suffer from limitations; for example, they may be influenced by emotional factors, and reports of internal efforts may be unreliable. Therefore, we cannot conclude that one means of assessment is preferable to another to evaluate coping after ABI.[1]

A tradeoff between feasibility and psychometric properties may exist. Fewer items could reduce reliability and validity. Unfortunately, detailed information regarding psychometric properties was often unavailable, and psychometric properties that were investigated were often only poor-to-moderate. These weaknesses are at least partially caused by the absence of consensus regarding the conceptualization of coping.[6] The identified coping instruments contained different dimensions, reflecting the various underlying theoretical concepts. In addition, because coping is often considered to be variable, problems are generated regarding reliability and validity.

Although test-retest reliability is important in conducting research and in clinical practice, it has rarely been investigated in measures of coping of patients with ABI. Coping is often conceptualized as situation-specific and changing over time in response to situational demands and to feedback from earlier coping attempts.[48] These changes in coping between testing administrations complicate the assessment of test-retest reliability. Measuring the test-retest reliability of dispositional coping questionnaires appears more straightforward because dispositional coping can be measured at multiple time points. However, it is important to control for any events that might have changed the use of coping styles (eg, life events and treatment).

Because information regarding test-retest reliability was generally absent, evaluation of the responsiveness of the instruments should be interpreted with caution. Several studies investigated changes in coping over time, with many instruments showing good responsiveness, for example references 5 and 41.

TABLE 2 *Summary of psychometric properties of instruments*

	Internal consistency[a]	Test-retest reliability[b]	Convergent validity[c]	Factorial validity[d]	Responsiveness[e]
AACS	?	?	?	?	±?
Brief COPE	+	?	?	+	?
CHIP	±	?	?	?	+
CISS	?	?	?	?	?
COPE	±	?	?	±	+
CSA-s	?	?	?	?	+
CSQ	?	?	?	?	?
FQCI-s	−	?	?	?	+
MASS	±	±	?	?	?
TCS/TSCI	±	?	?	?	+
UCL-o	?	?	?	?	?
UCL	?	?	?	?	+
WCCL(R)	+	?	?	±	?
WCQ-r	±	?	?	−	+

Abbreviations: AACS, Assimilative Accommodative Coping Scale; CHIP, Coping With Health Injuries and Problems; CISS, Coping Inventory for Stressful Situations; COPE; CSA, Coping Scale for Adults; CSQ, Coping Style Questionnaire; FQCI, Freiburg Questionnaire on Coping With Illness; MASS, Mental Adjustment to Stroke Scale; TCS, Trier Coping Scales; TSCI, Trier Scales on Coping With Illness; UCL, Utrecht Coping List; WCCL(R), Ways of Coping Checklist Revised; WCQ, Ways of Coping Questionnaire; -s, short version; -r, revised version; -o, original version; +, sufficient; ± moderate; −, insufficient; ?, unknown; ±? ambiguous.

[a]Cronbach α: −, <0.70; ±, .70–0.80; +, >0.80.

[b]κ, ICC: −,<0.70; ±, 0.70–0.80; +, >0.80.

[c]Correlation coefficients (Pearson, Spearman) with other coping instruments, other clinical variables or between subscales: −, <0.30 no correlation; ±, .30-.60; moderate correlation; +, >0.60 strong correlation.

[d]+: Multidimensional structure confirmed by factor or principal component analysis; ±?: ambiguous evidence for confirmation of factor structure by factor or principal component analysis; −: structure not confirmed by factor or principal component analysis.

[e]Changes in coping demonstrated in clinical trials or follow-up studies, ±?, NS; +, S ($P < .05$ or effect size >0.4).

Convergent validity has not been studied in patients with ABI because none of the studies used more than 1 instrument to assess coping. Notably, in other populations, such as students and patients with multiple sclerosis or cancer, these relations have been investigated. In general, moderate to strong correlations have been found between similar scales of coping, such as the COPE, WCQ-r, and CHIP, showing evidence for good convergent validity in these populations.[49–54]

Evidence for the multidimensional structure of coping is scarce. Only the factor structure of the brief COPE was replicated. Some support was found for the COPE and WCCL(R), whereas most studies could not replicate the factor structure of the WCQ-r, for example references 37 and 40. This is consistent with coping research in other populations showing that the WCQ-r has an unstable nonreplicable factor structure.[55] Therefore, Tennen and Herzberger[55] recommended that factor analyses be conducted for every study population, which naturally complicates the comparison of outcomes even across studies that used the same coping instrument. Moreover, we noticed that many studies changed the quantity or phrasing of certain items, further complicating comparisons across studies and questioning the methodological adequacy of the instrument.[56]

Strengths and limitations

This study is unique in several aspects. It provides a comprehensive overview of coping instruments used in the ABI population. Moreover, it is the first study to simultaneously review information about conceptualization, feasibility, and psychometric properties of coping instruments used after ABI, on which we base our recommendations for instrument selection.

We might have excluded some potentially useful coping instruments for the ABI population. For example, we excluded instruments in which coping was defined as a general capacity to solve problems (Problem-Solving Inventory) or as dealing with stress in a laboratory setting (Baycrest Psychosocial Stress Test).[57–59] Depending on these excluded definitions of coping, these instruments could be used in studies measuring coping after ABI. We further excluded coping instruments in which only 1 domain of coping was measured. While these instruments are useful for measuring a particular coping domain, because coping is a complex and multi-domain construct, we focused on instruments with a broader focus. Finally, our search strategy may have overlooked some coping instruments. For example, we only searched 3 databases for articles written in English. Nevertheless, by scanning the reference lists of selected articles, we

believe that the risk of missing relevant articles was minimal.

Implications and future research

Based on psychometric properties alone, no single questionnaire excelled, nor was any questionnaire judged completely negative. This was primarily due to the lack of information about psychometric properties in the reviewed articles. Implications should therefore be interpreted with caution. In persons with mild injuries, less cognitive impairment, and who are not easily fatigued, we suggest that the COPE is most suitable. The COPE is the questionnaire that was investigated most comprehensively, is freely available, and showed sufficient-to-good psychometric properties. However, because many people with ABI report fatigue and cognitive impairments, we believe that the feasibility of an instrument is also very important. Unfortunately, administration of the COPE is time-consuming. Unless the goal is to study the use of coping in a specific situation, measuring preferred, dispositional coping styles precludes multiple assessments and is therefore less time-consuming. In particular, the brief COPE is promising, shows good internal consistency and factorial validity, and consists of only 28 items; thus, it may be used with more severely injured patients. The UCL and CSA-s stood out in terms of feasibility while also showing good responsiveness. The CHIP may be recommended in instances when patients cannot complete the questionnaires themselves—for example, when patients suffer from language, communication, or awareness deficits—because it can be completed by informed others.

In future research, it will be important to investigate the psychometric properties of coping instruments used in ABI populations. Specifically, the COPE and brief COPE showed promise so far, as well as the UCL, CSA-s, and CHIP, although their properties are less well studied. Furthermore, increased clarity in the conceptualization of coping may lead to improvements to the psychometric properties of the coping instruments.[6] In addition, almost all of the reviewed instruments utilized retrospective reports that are subject to memory decay because of the elapsed time between the reported stressful events and the time of the coping assessment and they may also be influenced by the success of the coping strategy.[60] No daily or moment-to-moment assessment procedures have been used in the evaluation of persons with ABI, although these procedures have sometimes been recommended in the general literature.[7] The development and use of momentary assessments of coping are important avenues for future research.

CONCLUSIONS

Although coping is a widely used concept, its operational definition and assessment are complex. In the field of ABI, researchers and clinicians regularly use the term coping, but no consensus exists on what this actually entails. The lack of an agreed-upon operationalized definition of coping partly explains why psychometric properties of coping instruments have generally been poor to moderate and are rarely investigated. After synthesizing and reviewing information about the conceptualization, feasibility, and psychometric properties, we cautiously recommend the use of the COPE for patients with mild injuries; the brief COPE, CSA-s, and UCL for patients with moderate to severe cognitive deficits; and the CHIP other report for patients who are severely injured and struggle with commonly used self-report formats. Other instruments may be used when researchers or clinicians have specific questions, such as how an individual is coping with a specific stressful situation or illness. This systematic review can guide clinicians and researchers in selecting the most suitable coping instrument for use with individual survivors of ABI.

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APPENDIX 1 *Details of the literature search "Instruments of coping after acquired brain injury"*

PubMed	
Set 1	coping[tw]
Set 2	"brain injuries" [MeSH Terms] OR "stroke" [MeSH Terms] OR "cerebrovascular disorders" [MeSH Terms] OR brain injur*[tw] OR brain-injur*[tw] OR head injur*[tw] OR head-injur*[tw] OR brain damage*[tw] OR TBI[tw] OR head trauma[tw] OR stroke[tw] OR vascular disorder*[tw] OR cerebrovascular disorder*[tw] OR vascular accident*[tw] OR cerebrovascular accident*[tw] OR CVA[tw]
Set 3	"humans"[MeSH Terms] AND Journal Article[ptyp] AND English[lang] AND "adult"[MeSH Terms] AND ("1970/01/01"[PDAT] : "2011/10/31"[PDAT])
PsycINFO	
Set 1	TX ("coping")
Set 2	MJ ("Cerebrovascular accidents" OR "Brain damage" OR "Traumatic brain injury") OR TX ("brain injur*"OR "brain-injur*" OR "head injur*" OR "head-injur*" OR "brain damag*" OR "TBI" OR "head trauma" OR "stroke" OR "vascular disorder*" OR "cerebrovascular disorder*" OR "vascular accident*" OR "cerebrovascular accident*" OR "CVA")
Set 3	Published Date from: 19700101–20111031; Publication Type: All Journals; English; Age Groups: Adulthood (18 yrs & older); Population Group: Human; Document Type: Journal Article
CINAHL	
Set 1	TX ("coping")
Set 2	MJ ("Cerebrovascular accidents" OR "Brain damage" OR "Traumatic brain injury") OR TX ("brain injur*" OR "brain-injur*" OR "head injur*" OR "head-injur*" OR "brain damag*" OR "TBI" OR "head trauma" OR "stroke" OR "vascular disorder*" OR "cerebrovascular disorder*" OR "vascular accident*" OR "cerebrovascular accident*" OR "CVA")
Set 3	Limiters—Published Date from: 19700101–20111031; Human; Publication Type: Journal Article; Language: English; Age Groups: Adult: 19–44 years, Middle Aged: 45–64 years, Aged: 65+ years, Aged, 80 and over
Result sets	Combination of set 1 AND set 2 AND set 3 per search engine

APPENDIX 2 *Excluded articles based on full text*

Exclusion criteria	Measure	References
Not available	Ways of Coping Checklist	61
No adult coping scale	Adolescent Coping Scale	62
No coping instrument	No coping[a]	
	Perceived Self-Regulatory Ability Inventory	63
	Optimization in Primary and Secondary Control	64
	Problem-Solving Inventory	59
	Social Problem-Solving Inventory	65
	Baycrest Psychosocial Stress Test	57,58
	Resources	
	Sense of Coherence	32,33,66–71
	Coping Resources Inventory for Stress	72,73
	Coping Resources Questionnaire	74
	Effectiveness	
	Acceptance of Disability Scale	75
	McNett Coping Effectiveness Questionnaire	61
	Skillfulness	
	Adaptive Skills Battery	76
Specific consequence/functioning	Vertigo Coping Questionnaire	77
	Coping Strategies Questionnaire	78
	F-COPES—family functioning	79
	Family Coping Behavior	80
One subscale	Health and Daily Living Form	81,82
	Preference-Based Stroke Index	83
	General Health Questionnaire	84
	Millon Behavioral Medicine Diagnostic	85
	Brain Injury Grief Inventory	86
	Impact of Event Scale	87
	National Health Interview Survey	88
	Acceptance and Action Questionnaire	89
	Symptom Expectancy Checklist	90,91
Used in 1 sample	Strategies for Handling Stress	68
	ABI Distress and Coping Scale	92
	Coping Scale for Adults	93
	Coping Response Inventory	94
	Ways of Coping Questionnaire-short versions	95–97
	Ways of Coping Questionnaire—revised versions	98–101
	Ways of Coping Questionnaire—Cardiovascular Accident	22

Abbreviation: ABI, acquired brain injury.
[a]As defined as cognitively and behaviorally dealing with problems.